[Designation of Document] Claims

[Claim 1] A method of representing parent-child relationship among nodes constituting a tree data structure on a storage device, wherein said parent-child relationship among nodes is represented such that each of non-root nodes which is a node other than a root node is associated with the root node thereof.

[Claim 2] A method of building a tree data structure on a storage device comprising:

a node definition step of assigning unique node identifiers to nodes including a root node; and

a parent-child relationship definition step of associating with node identifiers assigned to non-root nodes corresponding to nodes other than the root node, node identifiers assigned to parent nodes of the respective non-root nodes.

[Claim 3] The method according to claim 2, wherein the node definition step uses numeral values as the node identifiers.

[Claim 4] The method according to claim 2, wherein the node definition step uses sequential integers as the node identifiers.

[Claim 5] The method according to claim 1, wherein the parent-child relationship among the nodes is represented by the array of the parent nodes associated with the respective non-root nodes.

[Claim 6]　The method according to claim 2, wherein the parent-child relationship definition step stores in the storage device the array of the node identifiers assigned to the parent nodes associated with the node identifiers assigned to the respective non-root nodes.

[Claim 7]　A method of building a tree data structure on a storage device, comprising:

a node definition step of assigning unique sequential integers to nodes including a root node while giving higher priority to child nodes than same-generation nodes; and

a parent-child relationship definition step of storing in the storage device an array formed by arranging, in the order of integers assigned to non-root nodes corresponding to nodes other than the root node, integers assigned to parent nodes of the respective non-root nodes.

[Claim 8]　The method according to claim 7, wherein the node definition step comprises:

a step of first assigning numbers to the root node;

a step in which when a certain node to which a number has been already assigned has a unique child node, the next number to the number assigned to the node concerned is assigned to the child node concerned; and

a step in which when a certain node to which a number has been already assigned has plural child nodes, numbers are assigned to nodes from the first child node to the last child

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node according to brother relationship among the plural child nodes so that numbers are assigned to all child nodes of an immediate older brother node and then the next number is assigned to a just younger brother node.

[Claim 9] A method of building a tree data structure on a storage device comprising:

a node definition step of assigning unique sequential integers to nodes including a root node while giving higher priority to same-generation nodes than child nodes; and

a parent-child relationship definition step of storing in the storage device an array formed by arranging, in the order of integers assigned to non-root nodes corresponding to nodes other than the root node, integers assigned to parent nodes corresponding to the respective non-root nodes.

[Claim 10] The method according to claim 9, wherein the node definition step comprises:

a step of determining what generation node each node is from the root node and calculating the number of nodes contained in each generation;

a step of first assigning numbers to the root node; and

a step in which if numbers are assigned to all nodes contained in a generation, until there exists no node in the next generation of the generation concerned, when parent nodes of all nodes contained in the next generation are different from one another, numbers are assigned to the nodes concerned

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in the order of assigning numbers to the parent nodes concerned while when the parent nodes are identical to one another, brother relationship is defined among plural child nodes derived from the parent nodes concerned and unique integers sequentially varying from the next number of a just-before assigned number are assigned to the nodes from the first child node to the last child node.

[Claim 11] The method according to claim 7 or 8, further comprising a step of extracting from the array sequential areas in which values above an integer assigned to some node are stored, thereby specifying all descendant nodes of the node concerned.

[Claim 12] The method according to claim 9 or 10, further comprising a step of extracting from the array sequential areas where the same value as an integer assigned to some node is stored, thereby specifying all child nodes of the node concerned.

[Claim 13] A method of building a tree data structure on a storage device comprising:

a step of uniquely assigning sequentially varying integers to all nodes while starting from a root node; and

a step of defining parent-child relationship among nodes, wherein the step of uniquely assigning the integers to all the nodes comprises:

a step of determining which one of a depth-first mode

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for assigning numbers to child nodes in preference to same-generation nodes and a width-first mode for assigning numbers to same-generation nodes in preference to child nodes should be selected to assign numbers to nodes;

a step of searching the nodes in the depth-first mode when the depth-first mode is selected, and assigning the numbers to the nodes in the search order; and

a step of searching the nodes in the width-first mode when the width-first mode is selected, and assigning the numbers to the nodes in the search order,

wherein the step of defining the parent-child relationship among the nodes includes a step of storing numbers assigned to parent nodes corresponding to the child nodes in the order of numbers assigned to the child nodes concerned.

[Claim 14] The method according to claim 13, wherein the step of defining the parent-child relationship among the nodes comprises:

a step of determining which one of a child-parent expression mode for defining the relationship from a child node to a parent node and a parent-child expression mode for defining the relationship from a parent node to a child node should be selected to define the parent-child relationship;

a step of storing in the storage device numbers assigned to parent nodes corresponding to child nodes in the order of numbers assigned to the child nodes concerned when the

child-parent expression mode is selected; and

a step of storing in the storage device numbers assigned to child nodes corresponding to parent nodes in the order of numbers assigned to the parent nodes concerned when the parent-child expression mode is selected.

[Claim 15] A method of converting an expression form of a tree data structure represented by using parent-child relationship on a storage device, the parent-child relationship being defined by storing, in the order of numbers assigned to child nodes, numbers assigned to parent nodes corresponding to the child nodes in the storage device, comprising:

a step of determining the generation of each node of a tree data structure expressed in a depth-first mode for assigning numbers to nodes while giving higher priority to child nodes than same-generation nodes, and counting the number of nodes belonging to each generation;

a step of determining numbers assigned in each generation on the basis of the number of nodes belonging to each generation when numbers are assigned in a width-first mode for assigning numbers to nodes while giving higher priority to same-generation nodes than child nodes;

a step of creating a conversion array for converting numbers of the respective nodes to numbers assigned in the width-first mode on the basis of the determined generation of the nodes and the determined numbers assigned in each

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generation; and

a step of converting the parent-child relationship of the respective nodes to parent-child relationship expressed by numbers assigned in the width-first mode by using the conversion array.

[Claim 16] A method of converting an expression form of a tree data structure represented by using parent-child relationship on a storage device, the parent-child relationship being defined by storing, in the order of numbers assigned to child nodes, numbers assigned to parent nodes corresponding to the child nodes in the storage device, comprising:

a step of counting the number of descendants of each node of a tree data structure expressed in a width-first mode for assigning numbers to nodes while giving higher priority to same-generation nodes than child nodes;

a step of adding the number to be assigned to the parent node with the number of older nodes out of brother nodes derived from the same parent node of the node concerned, numbers being assigned to the older nodes prior to the node concerned, and also with the number of descendants of the older brother nodes, thereby creating a conversion array for converting the numbers assigned in the width-first mode to numbers assigned in the depth-first mode for assigning numbers to nodes while giving higher priority to child nodes than same-generation nodes; and

a step of converting the parent-child relationship of

each node to the parent-child relationship expressed by the numbers assigned in the depth-first mode by using the conversion array.

[Claim 17] A method of converting an expression form of a tree data structure represented by using parent-child relationship on a storage device, the parent-child relationship being defined by storing, in the order of numbers assigned to child nodes, numbers assigned to parent nodes corresponding to the child nodes in the storage device, comprising:

a step of searching in a depth-first a tree data structure expressed in a width-first mode for assigning numbers to nodes while giving higher priority to same-generation nodes than child nodes, and creating a conversion array for converting numbers assigned in the width-first mode to numbers assigned in the depth-first mode for assigning numbers to nodes while giving higher priority to child nodes than same-generation nodes; and

a step of converting the parent-child relationship of the respective nodes to parent-child relationship expressed by numbers assigned in the depth-first mode by using the conversion array.

[Claim 18] A method of converting an expression form of a tree data structure represented by using parent-child relationship on a storage device, the parent-child relationship being defined by storing, in the order of numbers assigned to child

node, numbers assigned to parent nodes corresponding to the child nodes as elements of a first array in the storage device, comprising:

a step of counting an appearing frequency of the numbers assigned to each node as an element of the first array;

a step of securing sequential numbers whose number corresponds to the counted frequency, as a second array in the storage area in order to store the numbers assigned to the child nodes corresponding to each node; and

a step of successively reading out the elements of the first array, and successively storing the numbers of the child nodes for the elements of the first array as the elements of the second array secured for the nodes to which numbers having the values coincident with the elements concerned are assigned.

[Claim 19] A method of converting an expression form of a tree data structure represented by using parent-child relationship on a storage device, the parent-child relationship being defined by storing, in the order of numbers assigned to parent nodes, numbers assigned to child nodes corresponding to the parent nodes as elements of a first array in the storage device, comprising:

a step of securing a second array in the storage device in order to store numbers assigned to the parent nodes corresponding to child nodes in the order of numbers assigned to the child nodes concerned; and

a step of successively reading out the elements of the first array and successively storing the numbers of the parent nodes for the elements of the first array as elements of second array secured for nodes to which numbers having values coincident with the elements are assigned.

[Claim 20] An information processing device of building a tree data structure on a storage device comprising:

node definition means for assigning unique node identifiers to nodes including a root node; and

parent-child relationship definition means for associating with node identifiers assigned to non-root nodes corresponding to nodes other than the root node, node identifiers assigned to parent nodes of the respective non-root nodes.

[Claim 21] The information processing device according to claim 20, wherein the node definition means uses numeral values as the node identifiers.

[Claim 22] The information processing device according to claim 20, wherein the node definition means uses sequential integers as the node identifiers.

[Claim 23] The information processing device method according to claim 20, wherein the parent-child relationship definition step stores in the storage device the array of the node identifiers assigned to the parent nodes associated with the node identifiers assigned to the respective non-root nodes.

[Claim 24] An information processing device of building a tree data structure on a storage device, comprising:

node definition means for assigning unique sequential integers to nodes including a root node while giving higher priority to child nodes than same-generation nodes; and

parent-child relationship definition means for storing in the storage device an array formed by arranging, in the order of integers assigned to non-root nodes corresponding to nodes other than the root node, integers assigned to parent nodes of the respective non-root nodes.

[Claim 25] The information processing device according to claim 24, wherein the node definition means comprises:

means for first assigning numbers to the root node;

means in which when a certain node to which a number has been already assigned has a unique child node, the next number to the number assigned to the node concerned is assigned to the child node concerned; and

means in which when a certain node to which a number has been already assigned has plural child nodes, numbers are assigned to nodes from the first child node to the last child node according to brother relationship among the plural child nodes so that numbers are assigned to all child nodes of an immediate older brother node and then the next number is assigned to a just younger brother node.

[Claim 26] An information processing device of building a

tree data structure on a storage device comprising:

node definition means for assigning unique sequential integers to nodes including a root node while giving higher priority to same-generation nodes than child nodes; and

parent-child relationship definition means for storing in the storage device an array formed by arranging, in the order of integers assigned to non-root nodes corresponding to nodes other than the root node, integers assigned to parent nodes corresponding to the respective non-root nodes.

[Claim 27] The information processing device according to claim 26, wherein the node definition means comprises:

means for determining what generation node each node is from the root node and calculating the number of nodes contained in each generation;

means for first assigning numbers to the root node; and

means in which if numbers are assigned to all nodes contained in a generation, until there exists no node in the next generation of the generation concerned, when parent nodes of all nodes contained in the next generation are different from one another, numbers are assigned to the nodes concerned in the order of assigning numbers to the parent nodes concerned while when the parent nodes are identical to one another, brother relationship is defined among plural child nodes derived from the parent nodes concerned and unique integers sequentially varying from the next number of a just-before

assigned number are assigned to the nodes from the first child node to the last child node.

[Claim 28] The information processing device according to claim 24 or 25, further comprising means for extracting from the array sequential areas in which values above an integer assigned to some node are stored, thereby specifying all descendant nodes of the node concerned.

[Claim 29] The information processing device according to claim 26 or 27, further comprising means for extracting from the array sequential areas where the same value as an integer assigned to some node is stored, thereby specifying all child nodes of the node concerned.

[Claim 30] An information processing device of building a tree data structure on a storage device comprising:

means for uniquely assigning sequentially varying integers to all nodes while starting from a root node; and

means for defining parent-child relationship among nodes, wherein the means for uniquely assigning the integers to all the nodes comprises:

means for determining which one of a depth-first mode for assigning numbers to child nodes in preference to same-generation nodes and a width-first mode for assigning numbers to same-generation nodes in preference to child nodes should be selected to assign numbers to nodes;

means for searching the nodes in the depth-first mode

when the depth-first mode is selected, and assigning the numbers to the nodes in the search order; and

means for searching the nodes in the width-first mode when the width-first mode is selected, and assigning the numbers to the nodes in the search order,

wherein the means for defining the parent-child relationship among the nodes includes means for storing numbers assigned to parent nodes corresponding to the child nodes in the order of numbers assigned to the child nodes concerned.

[Claim 31] The information processing device according to claim 30, wherein the means for defining the parent-child relationship among the nodes comprises:

means for determining which one of a child-parent expression mode for defining the relationship from a child node to a parent node and a parent-child expression mode for defining the relationship from a parent node to a child node should be selected to define the parent-child relationship;

means for storing in the storage device numbers assigned to parent nodes corresponding to child nodes in the order of numbers assigned to the child nodes concerned when the child-parent expression mode is selected; and

means for storing in the storage device numbers assigned to child nodes corresponding to parent nodes in the order of numbers assigned to the parent nodes concerned when the parent-child expression mode is selected.

[Claim 32] An information processing device of converting an expression form of a tree data structure represented by using parent-child relationship on a storage device, said storage device holding the parent-child relationship defined by assigning, in the order of numbers assigned to child nodes, numbers to parent nodes corresponding to the child nodes, comprising:

means for of determining the generation of each node of a tree data structure expressed in a depth-first mode for assigning numbers to nodes while giving higher priority to child nodes than same-generation nodes, and counting the number of nodes belonging to each generation;

means for determining numbers assigned in each generation on the basis of the number of nodes belonging to each generation when numbers are assigned in a width-first mode for assigning numbers to nodes while giving higher priority to same-generation nodes than child nodes;

means for creating a conversion array for converting numbers of the respective nodes to numbers assigned in the width-first mode on the basis of the determined generation of the nodes and the determined numbers assigned in each generation; and

means for converting the parent-child relationship of the respective nodes to parent-child relationship expressed by numbers assigned in the width-first mode by using the

conversion array.

[Claim 33] An information processing device of converting an expression form of a tree data structure represented by using parent-child relationship on a storage device, said storage device holding the parent-child relationship defined by assigning, in the order of numbers assigned to child nodes, numbers to parent nodes corresponding to the child nodes, comprising:

means for counting the number of descendants of each node of a tree data structure expressed in a width-first mode for assigning numbers to nodes while giving higher priority to same-generation nodes than child nodes;

means for adding the number to be assigned to the parent node with the number of older nodes out of brother nodes derived from the same parent node of the node concerned, numbers being assigned to the older nodes prior to the node concerned, and also with the number of descendants of the older brother nodes, thereby creating a conversion array for converting the numbers assigned in the width-first mode to numbers assigned in the depth-first mode for assigning numbers to nodes while giving higher priority to child nodes than same-generation nodes; and

means for converting the parent-child relationship of each node to the parent-child relationship expressed by the numbers assigned in the depth-first mode by using the conversion array.

[Claim 34] An information processing device of converting an expression form of a tree data structure represented by using parent-child relationship on a storage device, said storage device holding the parent-child relationship defined by assigning, in the order of numbers assigned to child nodes, numbers to parent nodes corresponding to the child nodes, comprising:

means for searching in a depth-first a tree data structure expressed in a width-first mode for assigning numbers to nodes while giving higher priority to same-generation nodes than child nodes, and creating a conversion array for converting numbers assigned in the width-first mode to numbers assigned in the depth-first mode for assigning numbers to nodes while giving higher priority to child nodes than same-generation nodes; and

means for converting the parent-child relationship of the respective nodes to parent-child relationship expressed by numbers assigned in the depth-first mode by using the conversion array.

[Claim 35] An information processing device of converting an expression form of a tree data structure represented by using parent-child relationship on a storage device, wherein the storage device holds, in the order of numbers assigned to child node, numbers assigned to parent nodes corresponding to the child nodes as elements of a first array defining the

parent-child relationship and said device comprises:

means for counting an appearing frequency of the numbers assigned to each node as an element of the first array;

means for securing sequential numbers whose number corresponds to the counted frequency, as a second array in the storage area in order to store the numbers assigned to the child nodes corresponding to each node; and

means for successively reading out the elements of the first array, and successively storing the numbers of the child nodes for the elements of the first array as the elements of the second array secured for the nodes to which numbers having the values coincident with the elements concerned are assigned.

[Claim 36] An information processing device of converting an expression form of a tree data structure represented by using parent-child relationship on a storage device, wherein the storage device holds, in the order of numbers assigned to parent node, numbers assigned to child nodes corresponding to the parent nodes as elements of a first array defining the parent-child relationship, and said device comprises:

means for securing a second array in the storage device in order to store numbers assigned to the parent nodes corresponding to child nodes in the order of numbers assigned to the child nodes concerned; and

means for successively reading out the elements of the first array and successively storing the numbers of the parent

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nodes for the elements of the first array as elements of second array secured for nodes to which numbers having values coincident with the elements are assigned.

[Claim 37]   A program for making a computer of building a tree data structure on a storage device execute:

a node definition function of assigning unique node identifiers to nodes including a root node; and

a parent-child relationship definition function of associating with the node identifiers assigned to non-root nodes corresponding to nodes other than the root node, node identifiers assigned to parent nodes of the respective non-root nodes.

[Claim 38]   The program according to claim 37, wherein the node definition function uses numeral values as the node identifiers.

[Claim 39]   The program according to claim 37, wherein the node definition function uses sequential integers as the node identifiers.

[Claim 40]   The program according to claim 37, wherein the parent-child relationship definition function stores in the storage device the array of the node identifiers assigned to the parent nodes associated with the node identifiers assigned to the respective non-root nodes.

[Claim 41]   A program for making a computer of building a tree data structure on a storage device execute:

a node definition function of assigning unique sequential integers to nodes including a root node while giving higher priority to child nodes than same-generation nodes; and

a parent-child relationship definition function of storing in the storage device an array formed by arranging, in the order of integers assigned to non-root node s corresponding to nodes other than the root node, integers assigned to parent nodes of the respective non-root nodes.

[Claim 42] The program according to claim 41, wherein the node definition function comprises:

a function of first assigning numbers to the root node;

a function in which when a certain node to which a number has been already assigned has a unique child node, the next number to the number assigned to the node concerned is assigned to the child node concerned; and

a function in which when a certain node to which a number has been already assigned has plural child nodes, numbers are assigned to nodes from the first child node to the last child node according to brother relationship among the plural child nodes so that numbers are assigned to all child nodes of an immediate older brother node and then the next number is assigned to a just younger brother node.

[Claim 43] A program making a computer of building a tree data structure on a storage device execute:

a node definition function of assigning unique

sequential integers to nodes including a root node while giving higher priority to same-generation nodes than child nodes; and

a parent-child relationship definition function of storing in the storage device an array formed by arranging, in the order of assigned non-root nodes corresponding to nodes other than the root node, integers assigned to parent nodes corresponding to the respective non-root nodes.

[Claim 44] The program according to claim 43, wherein the node definition function comprises:

a function of determining what generation node each node is from the root node and calculating the number of nodes contained in each generation;

a function of first assigning numbers to the root node; and

a function in which if numbers are assigned to all nodes contained in a generation, until there exists no node in the next generation of the generation concerned, when parent nodes of all nodes contained in the next generation are different from one another, numbers are assigned to the nodes concerned in the order of assigning numbers to the parent nodes concerned while when the parent nodes are identical to one another, brother relationship is defined among plural child nodes derived from the parent nodes concerned and unique integers sequentially varying from the next number of a just-before assigned number are assigned to the nodes from the first child

node to the last child node.

[Claim 45] The program according to claim 41 or 42, further comprising a function of extracting from the array sequential areas in which values above an integer assigned to some node are stored, thereby specifying all descendant nodes of the node concerned.

[Claim 46] The program according to claim 43 or 44, further comprising a function of extracting from the array sequential areas where the same value as an integer assigned to some node is stored, thereby specifying all child nodes of the node concerned.

[Claim 47] A program for making a computer of building a tree data structure on a storage device execute:

a function of uniquely assigning sequentially varying integers to all nodes while starting from a root node; and

a function of defining parent-child relationship among nodes, wherein the function of uniquely assigning the integers to all the nodes comprises:

a function of determining which one of a depth-first mode for assigning numbers to child nodes in preference to same-generation nodes and a width-first mode for assigning numbers to same-generation nodes in preference to child nodes should be selected to assign numbers to nodes;

a function of searching the nodes in the depth-first mode when the depth-first mode is selected, and assigning the

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numbers to the nodes in the search order; and

a function of searching the nodes in the width-first mode when the width-first mode is selected, and assigning the numbers to the nodes in the search order,

wherein the function of defining the parent-child relationship among the nodes includes a function of storing numbers assigned to parent nodes corresponding to the child nodes in the order of numbers assigned to the child nodes concerned.

[Claim 48] The program according to claim 47, wherein the function of defining the parent-child relationship among the nodes comprises:

a function of determining which one of a child-parent expression mode for defining the relationship from a child node to a parent node and a parent-child expression mode for defining the relationship from a parent node to a child node should be selected to define the parent-child relationship;

a function of storing in the storage device numbers assigned to parent nodes corresponding to child nodes in the order of numbers assigned to the child nodes concerned when the child-parent expression mode is selected; and

a function of storing in the storage device numbers assigned to child nodes corresponding to parent nodes in the order of numbers assigned to the parent nodes concerned when the parent-child expression mode is selected.

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[Claim 49] A program for making a computer of converting an expression form of a tree data structure represented by using parent-child relationship on a storage device execute:

a function of defining the parent-child relationship by storing, in the order of numbers assigned to child nodes, numbers assigned to parent nodes corresponding to the child nodes in the storage device;

a function of determining the generation of each node of a tree data structure expressed in a depth-first mode for assigning numbers to nodes while giving higher priority to child nodes than same-generation nodes, and counting the number of nodes belonging to each generation;

a function of determining numbers assigned in each generation on the basis of the number of nodes belonging to each generation when numbers are assigned in a width-first mode for assigning numbers to nodes while giving higher priority to same-generation nodes than child nodes;

a function of creating a conversion array for converting numbers of the respective nodes to numbers assigned in the width-first mode on the basis of the determined generation of the nodes and the determined numbers assigned in each generation; and

a function of converting the parent-child relationship of the respective nodes to parent-child relationship expressed by numbers assigned in the width-first mode by using the

conversion array.

[Claim 50] A program for making a computer of converting an expression form of a tree data structure represented by using parent-child relationship on a storage device execute:

a function of defining the parent-child relationship by storing, in the order of numbers assigned to child nodes, numbers assigned to parent nodes corresponding to child nodes in the storage device;

a function of counting the number of descendants of each node of a tree data structure expressed in a width-first mode for assigning numbers to nodes while giving higher priority to same-generation nodes than child nodes;

a function of adding the number to be assigned to the parent node with the number of older nodes out of brother nodes derived from the same parent node of the node concerned, numbers being assigned to the older nodes prior to the node concerned, and also with the number of descendants of the older brother nodes, thereby creating a conversion array for converting the numbers assigned in the width-first mode to numbers assigned in the depth-first mode for assigning numbers to nodes while giving higher priority to child nodes than same-generation nodes; and

a function of converting the parent-child relationship of each node to the parent-child relationship expressed by the numbers assigned in the depth-first mode by using the

conversion array.

[Claim 51] A program for making a computer of converting an expression form of a tree data structure represented by using parent-child relationship on a storage device execute:

a function of defining the parent-child relationship by storing, in the order of numbers assigned to child nodes, numbers assigned to parent nodes corresponding to the child nodes in the storage device;

a function of searching in a depth-first a tree data structure expressed in a width-first mode for assigning numbers to nodes while giving higher priority to same-generation nodes than child nodes, and creating a conversion array for converting numbers assigned in the width-first mode to numbers assigned in the depth-first mode for assigning numbers to nodes while giving higher priority to child nodes than same-generation nodes; and

a function of converting the parent-child relationship of the respective nodes to parent-child relationship expressed by numbers assigned in the depth-first mode by using the conversion array.

[Claim 52] A program for making a computer of converting an expression form of a tree data structure represented by using parent-child relationship on a storage device execute:

a function of defining the parent-child relationship by storing, in the order of numbers assigned to child node, numbers

assigned to parent nodes corresponding to the child nodes as elements of a first array in the storage device;

a function of counting an appearing frequency of the numbers assigned to each node as an element of the first array;

a function of securing sequential numbers whose number corresponds to the counted frequency, as a second array in the storage area in order to store the numbers assigned to the child nodes corresponding to each node; and

a function of successively reading out the elements of the first array, and successively storing the numbers of the child nodes for the elements of the first array as the elements of the second array secured for the nodes to which numbers having the values coincident with the elements concerned are assigned.

[Claim 53] A computer for making a computer of converting an expression form of a tree data structure represented by using parent-child relationship on a storage device execute:

a function of defining the parent-child relationship by storing, in the order of numbers assigned to parent nodes, numbers assigned to child nodes corresponding to the parent nodes as elements of a first array in the storage device;

a function of securing a second array in the storage device in order to store numbers assigned to the parent nodes corresponding to child nodes in the order of numbers assigned to the child nodes concerned; and

a function of successively reading out the elements of the first array and successively storing the numbers of the parent nodes for the elements of the first array as elements of second array secured for nodes to which numbers having values coincident with the elements are assigned.

[Claim 54] A computer-readable recording medium recorded with the program according to any one of claims 37 to 53.